REMARKS

This application is a national stage filing under 35 U.S.C. § 371 of PCT Application No. PCT/DE00/03461, filed October 2, 2000, which was filed in the German language. Enclosed herewith please find a copy of the application translated into English as received from the translating party, entitled "Translation as Received". Also enclosed please find a copy of the application as amended with additions underlined and deletions crossed out, which application is entitled "Version of Application with Markings to Show Changes Made". Finally, enclosed please find a clean copy of the application as amended, entitled "Clean Version of Amended Application". Applicants enclose copies of the complete application to show the changes made and a clean copy of the complete application because under the new rules, applicants would have had to replace almost every paragraph in the application in this Preliminary Amendment. Applicants believe that no new subject matter has been added to the application.

Applicants respectfully request that all amendments made herein be duly entered into the application. If there are any question, please contact applicants' undersigned attorney.

Conclusion

Based upon the above amendments and remarks, Applicants believe the pending claims of the above-captioned application are in allowable form and patentable. Applicants respectfully request consideration of the application as amended and a prompt Notice of Allowance thereon.

Applicants believe that no extension of time is necessary to file this Preliminary Amendment. Should Applicants be mistaken, Applicants respectfully request that the Office grant such time extension pursuant to 37 C.F.R. § 1.136(a) as necessary to make this amendment timely, and hereby authorizes the Office to charge any necessary fee or surcharge with respect to said time extension to the deposit account of the undersigned firm of attorneys, Deposit Account 03-3325.

Please direct any questions or comments to Walter M. Douglas at (607) 974-2431.

Respectfully submitted,

CORNING INCORPORATED

Date: Feb. 12, 2002

Date of Deposit: Feb 12, 2002

I hereby certify that this paper (along with any paper referred to as being attached or enclosed) is being deposited with the United States Postal Service on the date indicated above with sufficient postage as first class mail in an envelope addressed to the: Commissioner of Patents and Trademarks, Washington, DC 20231

Signature Walter M. Douglas

Walter M. Douglas
Registration No. 34,510
Corning Incorporated
Patent Department
Mail Stop SP-TI-03-1
Corning, NY 14831

VERSION OF APPLICATION WITH MARKINGS TO SHOW CHANGES MADE

LIGHT WAVEGUIDE AND AN OPTICAL FIBER ISOLATOR

~~OPTICAL WAVEGUIDE AND FIBEROPTIC ISOLATOR~~

Priority Applications

[0001] This application claims the benefit of priority under 35 U.S.C. § 119 of German Patent Application No. 19947033.2, filed September 30, 1999, and is a national stage filing under 35 U.S.C. § 371 of PCT Application No. PCT/DE00/03461, filed October 2, 2000.

Field Of the Invention

[0002] The invention pertains to an optical waveguide and a fiberoptic isolator containing the waveguide.

Background Of The Invention

[0003] Fiberoptic components and sensors are gaining increasing importance in the transmission and processing of signals in optical communications systems and in many fiberoptic devices/systems. Fiberoptic devices/systems ordinarily contain at least one light-transmitting optical fiber (optical waveguide, glass fiber), a signal-processing component and/or a sensor, as well as a source (laser or laser diode) emitting coherent radiation.

[0004] In the transmission of signals over very long paths, such as intercontinental transmission, it is necessary to amplify the signal at regular intervals.

[0005] In most fiberoptic systems it must be assured that optical signals are not back-scattered into the laser light source or the optical amplifier, since this may bring about undesired oscillations. Moreover, the back-scattered light increases the noise level of the system.

[0006] To solve this problem, isolators are installed in fiberoptic systems and optical amplifiers. They guarantee that light is transmitted in only one direction, but propagation in the opposite direction is largely suppressed.

[0007] A commonly used optical isolator is the so-called "bulk" isolator. Here, a ~~magnetoöptical~~ magnetooptical crystal subjected to an external magnetic field is arranged between two polarizers whose directions of polarization enclose an angle of 45°. Due to the magnetooptical ~~magnetoöptical~~ effect (Faraday effect), the plane of polarization of the incident light is rotated by 45°, independently of its initial orientation. The incident linearly polarized light thus passes through the first polarizer rotating the plane of

VERSION OF APPLICATION WITH MARKINGS TO SHOW CHANGES MADE

polarization by 45°, so that it can pass through the second polarizer unattenuated. The plane of polarization of the back-scattered light reaching the second polarizer is likewise rotated by 45°, but is thus displaced by 90° with respect to the polarization direction of the first polarizer and cannot pass through it.

[0008] The use of a magnetooptical ~~magnetoöptical~~ film in place of a magnetooptical ~~magnetoöptical~~ crystal is also known.

[0009] Along with these "bulk" isolators, so-called "all-fiber" insulators are also used (see, for instance, US-A 5,479,542). Although the ~~magnetoöptical~~magnetooptical effect in the glass fiber is exploited in this type of isolator, an additional device for generating an external magnetic field is necessary. This has the disadvantage that the optical components are comparatively large and cannot be built into the cable. Additionally, the aforementioned isolators are extremely temperature- and humidity-sensitive. They must therefore be arranged protected from environmental influences in a closed container such as a sleeve. For certain network infrastructures such as oceanic cable or aerial cable networks, this is not possible at all or is possible only at great expense.

[0010]The problem of the invention is therefore to create an optical waveguide serving as a polarization rotator and which can be integrated into an optical waveguide system.

[0011] Another problem of the invention is to provide a fiberoptic isolator that avoids the above-mentioned disadvantages.

Summary Of The Invention

[0012] According to the invention, the problem is solved by an optical waveguide according to Claim 1 and by an optical isolator according to Claim ~~6~~5. The subordinate claims pertain to additional advantageous aspects of the invention.

[0013] The optical waveguide according to the invention contains a core whose material has a sufficiently large Faraday effect, as well as a magnetic or magnetizable outer coating that generates a permanent magnetic field producing the Faraday effect. Such a waveguide can be integrated into ordinary waveguide systems and easily joined to other waveguides (glass fibers, LWL cores, LWL fiber tapes and so on), in particular, by splicing.

[0014] In accordance with one aspect of the invention, the outer coating is formed by two half-shells, one half-shell constituting the magnetic south pole and the other the magnetic north pole. The magnetic field generated by the half-shells can be relatively weak, as long as the effective length, that is, the length of the half-shells enclosing the fiber core is selected to be sufficiently large, for instance, 10 m.

VERSION OF APPLICATION WITH MARKINGS TO SHOW CHANGES MADE

[0015] It has proven especially advantageous to dope the fiber core, normally consisting of quartz glass, with YIG material, which exhibits a sufficiently large Faraday effect.

[0016] Preferably, the optical waveguide according to the invention is used as a single waveguide.

[0017] The optical isolator according to the invention is a fiberoptic isolator with at least one polarizer and one polarization rotator with an optical waveguide that has a core having a sufficiently large Faraday effect and an outer coating. _According to the invention, the outer coating is configured such that it generates a permanent magnetic field in the core.

[0018] According to another advantageous aspect of the invention, the polarizer comprises a polarization-maintaining or a polarization-rotating glass fiber, where the fibers of the polarizer and the polarization rotator are constructed in one piece as spliced, continuous optical glass fibers.

Brief Description Of The Drawings

[0019] Additional advantages of the invention can be seen from the description below with the appended drawings, showing in:

[0020] Figure 1, the schematic structure of a known "bulk" isolator;

[0021] Figure 2, the essential elements of an optical isolator according to the invention; and

[0022] Figure 3, the optical isolator according to the invention in cross section.

Detailed Description of the Drawings

[0023] For better understanding of the invention, a conventional optical isolator will first be described with reference to Figure 1. _Via a glass fiber cable 21 containing an optical waveguide 27, (glass fiber, glass fiber core), a light signal reaches optical isolator 23, and reaches another glass fiber cable 25 via another optical waveguide 27. _Glass fibers 21 and 27 each consist of a core (index of refraction n_K) and a cladding (refractive index $n_M < n_K$).

[0024] The isolator consists of a polarizer and a polarization rotator, incident light being coupled into the polarizer by way of a plug connection or a splice 31. _The polarization rotator brings about a rotation of the polarization direction of the incident signal light by 45°. _The light rotated in the polarization direction leaves the isolator via an additional plug connection or splice 33.

VERSION OF APPLICATION WITH MARKINGS TO SHOW CHANGES MADE

[0025] A housing 35 that contains the plug connections/splices 31/33, the polarizer and the polarization rotator is provided for the protection of the isolator.

[0026] The rotation of the direction of polarization by the polarization rotator is achieved by means of the electrooptical effect. For this purpose a magnetic field is applied to a suitable crystal.

[0027] The extent of rotation (angle of rotation Φ of the plane of polarization) is calculated as:

$$\Phi = R \cdot l \cdot H$$

where l designates the length, H the magnetic field strength and R the material- and frequency-dependent Verdet constant.

[0028] Accordingly, the device shown in Figure 1 contains a means 39 generating a permanent magnetic field that is integrated into the isolator 23 seated on a mounting plate 39.

[0029] The device shown in Figure 1 has the disadvantage that it is not integrated into the cable, but rather the housing projects from the cable. This makes it difficult to lay the cable over rather long distances, such as in marine cables and the like.

[0030] Figure 2 shows a sketch of an isolator according to the invention. According to the invention, the isolator is integrated into cable 13 as a fiber-shaped element. Cable 13 has two optical waveguides 1, which are connected by way of the optical fiber isolator, consisting of a polarizer optical waveguide 1A and a polarization-rotating optical waveguide 1B. 2, 4, 6 designate the splice joints between the respective elements. Thus, the polarizer and the polarization rotator are integrated in the form of waveguides into cable 13. A polarizing fiber 1A (if the incident radiation is not polarized) or a polarization-maintaining fiber 1A (if the incident radiation is polarized) is used as the polarizer. A special glass fiber 1B, shown in cross section in Figure 3, is used as the polarization rotator. The length of the glass fiber 1A serving as polarizer can be relatively short (less than 5 m). The length of the polarization-rotating glass fiber 1B, on the other hand, depends on the wavelength of the radiation being used, the Verdet constant R of the core material, and the magnetic field strength H. By virtue of the above-described mode of construction the attenuations produced by the optical isolator are relatively low.

[0031] Figure 3 shows the schematic structure of the polarization-rotating waveguide 1B. It consists of a glass fiber core 11 with a positive Verdet constant R. The glass fiber core 11 is surrounded by a cladding 3. A coating 5 that consists of a magnetic or

VERSION OF APPLICATION WITH MARKINGS TO SHOW CHANGES MADE

magnetizable material is applied to the cladding 3. _The coating 5 generates the magnetic field at the site of the glass fiber core 11. _To this end, the magnetic coating is preferably divided into two half-shells forming the magnetic north and south poles.

[0032] Corresponding to a preferred embodiment, the glass fiber core 11 is doped with a material having a sufficiently large Verdet constant R. _An example of this in the range of a wavelength $\lambda > 1500$ nm is the material YIG (yttrium-iron garnet). _This has an angle of rotation of 175 °/cm at 10^4 G (1 T).

[0033] Because of the relatively large interaction lengths of roughly 10 m, it suffices that the coating 5 generates a relatively weak magnetic field. _Under the preconditions above and an interaction length l = 10 m, a magnetic field of 2.6 G (260 μT) is sufficient.

$$\underline{H = \Phi \div (R^* \cdot l), \qquad \text{wherein } * = 10^4\ \text{G}}$$

$$\underline{H = 45° \div [((175°/\text{cm}^*) \cdot 10^4\ \text{G}) \cdot 10\ \text{m})]}$$

$$\underline{H = 2.6\ \text{G}}$$

[0034] The magnetic or magnetizable materials/thin films known from data and sound recording technology come into particular consideration as coating 5.

[0035] Alongside the small diameter of the polarization rotator thus constructed, which permits integration into the cable, the possibility of easy joining by fusion splicing exists, which can reduce reflection at the joint site. _In combination with a polarizing or polarization-preserving glass fiber as polarizer, it is thus possible to construct an optical isolator that is completely integrated into the cable.

[0036] Although the invention was described in the foregoing with reference to a special embodiment, the invention is not limited thereto. _Instead of doping with YIG, for instance, doping can be accomplished with other materials with a suitable Verdet constant. _Such materials as those used for the magnetic coating of data media suggest themselves as materials for the magnetic coating. _It is possible to effect the magnetization of the coating only after application of the coating to the cladding 3 of glass fiber core 11.

VERSION OF APPLICATION WITH MARKINGS TO SHOW CHANGES MADE

Claims

1. ~~Optical waveguide with a fiber core (11) having a sufficiently large Faraday effect, a fiber cladding (3) and an outer coating (5), characterized in that the outer coating (5) consists of a magnetizable material or a material having magnetic properties.~~

An optical waveguide, said optical waveguide comprising a fiber core, a fiber cladding and an outer coating, wherein the outer coating consists of a magnetizable material or a material having magnetic properties, and that by means of this outer coating a sufficiently large magnetic field is generated that this, as well as the Faraday effect in the fiber core and the length of the light waveguide in that manner, to cause a substantial polarization rotation.

2. The Optical ~~Optical~~ waveguide according to Claim 1, wherein ~~characterized in that~~ the outer coating ~~(5)~~ is subdivided into two half-shells ~~(7, 9)~~ whose magnetic orientations are mutually opposed.

3. The optical ~~Optical~~ waveguide according to Claim 1, wherein ~~characterized in that~~ the core ~~(11)~~ is doped with YIG material.

4. The optical ~~Optical~~ waveguide according to Claim 1, wherein ~~characterized in that~~ the optical waveguide is a single waveguide.

5. ~~Optical isolator with a polarizer (15) and a polarization rotator (13) with an optical waveguide that contains a fiber core showing the Faraday effect, a fiber cladding (3) and an outer coating (5), characterized in that the outer coating (5) generates a permanent magnetic field in the core (11).~~

An optical isolator with a polarizer and a polarization rotor (13), having an associated light waveguide fiber having a fiber core showing a Faraday effect, a fiber cladding, and an outer fiber coating, wherein the outer fiber coating is such that it generated a permanent magnetic field in the fiber core, and that this magnetic field is sufficiently large that, along with the Frarday effect of the fiber core and the length of the light waveguide in such a manner to cause a substantial polarization rotation.

VERSION OF APPLICATION WITH MARKINGS TO SHOW CHANGES MADE

6. The optical ~~Optical~~ isolator according to Claim 5, wherein ~~characterized in that~~ the polarizer ~~(15)~~ comprises a polarization-preserving or polarization-rotating glass fiber, wherein the fibers of the polarizer ~~(15)~~ and the polarization rotator ~~(13)~~ are constructed in one piece as a continuous, spliced optical glass fibers.

7. The optical ~~Optical~~ isolator according to Claim 5, ~~characterized in that~~ ~~the~~wherein the outer coating ~~(5)~~ of the optical waveguide fiber is subdivided into two half-shells ~~(7, 9)~~ whose magnetic orientations are mutually opposed.

8. The optical ~~Optical~~ isolator according to Claim 5, ~~characterized in that~~ wherein the core ~~(11)~~ is doped with YIG material.

9. The optical ~~Optical~~ isolator according to Claim 5, ~~characterized in that~~ wherein the optical waveguide fiber is a single waveguide.

VERSION OF APPLICATION WITH MARKINGS TO SHOW CHANGES MADE

Abstract Of The Invention

~~1. Optical waveguide and fiberoptic isolator~~

~~2.~~The invention describes an optical waveguide and a fiberoptic isolator wherein the optical ~~rotating~~waveguide rotating the plane of polarization of coupled light consists of a fiber core (11) exhibiting the Faraday effect, a fiber cladding (3) and a coating (5) concentrically surrounding the YIG-doped fiber core (11) and generating a permanent magnetic field. _The outer coating (5) is manufactured from a material that is magnetizable or has magnetic properties.

~~3. Figure 3~~

~~4. Fiberoptic isolator~~

~~//insert figures//~~

Translation as Received

SI01-026

OPTICAL WAVEGUIDE AND FIBEROPTIC ISOLATOR

The invention pertains to an optical waveguide and a fiberoptic isolator containing the waveguide.

Fiberoptic components and sensors are gaining increasing importance in the transmission and processing of signals in optical communications systems and in many fiberoptic devices/systems. Fiberoptic devices/systems ordinarily contain at least one light-transmitting optical fiber (optical waveguide, glass fiber), a signal-processing component and/or a sensor, as well as a source (laser or laser diode) emitting coherent radiation.

In the transmission of signals over very long paths, such as intercontinental transmission, it is necessary to amplify the signal at regular intervals.

In most fiberoptic systems it must be assured that optical signals are not back-scattered into the laser light source or the optical amplifier, since this may bring about undesired oscillations. Moreover, the back-scattered light increases the noise level of the system.

To solve this problem, isolators are installed in fiberoptic systems and optical amplifiers. They guarantee that light is transmitted in only one direction, but propagation in the opposite direction is largely suppressed.

A commonly used optical isolator is the so-called "bulk" isolator. Here, a magnetoöptical crystal subjected to an external magnetic field is arranged between two polarizers whose directions of polarization enclose an angle of 45°. Due to the magnetoöptical effect (Faraday effect), the plane of polarization of the incident light is rotated by 45°, independently of its initial orientation. The incident linearly polarized light thus passes through the first polarizer rotating the plane of polarization by 45°, so that it can pass through the second polarizer unattenuated. The plane of polarization of the back-scattered light reaching the second polarizer is likewise rotated by 45°, but is thus displaced by 90° with respect to the polarization direction of the first polarizer and cannot pass through it.

The use of a magnetoöptical film in place of a magnetoöptical crystal is also known.

Along with these "bulk" isolators, so-called "all-fiber" insulators are also used (see, for instance, US-A 5,479,542). Although the magnetoöptical effect in the glass fiber is exploited in this type of isolator, an additional device for generating an external magnetic field is necessary. This has the disadvantage that the optical components are comparatively large and cannot be built into the cable. Additionally, the aforementioned

isolators are extremely temperature- and humidity-sensitive. They must therefore be arranged protected from environmental influences in a closed container such as a sleeve. For certain network infrastructures such as oceanic cable or aerial cable networks, this is not possible at all or is possible only at great expense.

The problem of the invention is therefore to create an optical waveguide serving as a polarization rotator and which can be integrated into an optical waveguide system.

Another problem of the invention is to provide a fiberoptic isolator that avoids the above-mentioned disadvantages.

According to the invention, the problem is solved by an optical waveguide according to Claim 1 and by an optical isolator according to Claim 6. The subordinate claims pertain to additional advantageous aspects of the invention.

The optical waveguide according to the invention contains a core whose material has a sufficiently large Faraday effect, as well as a magnetic or magnetizable outer coating that generates a permanent magnetic field producing the Faraday effect. Such a waveguide can be integrated into ordinary waveguide systems and easily joined to other waveguides (glass fibers, LWL cores, LWL fiber tapes and so on), in particular, by splicing.

In accordance with one aspect of the invention, the outer coating is formed by two half-shells, one half-shell constituting the magnetic south pole and the other the magnetic north pole. The magnetic field generated by the half-shells can be relatively weak, as long as the effective length, that is, the length of the half-shells enclosing the fiber core is selected to be sufficiently large, for instance, 10 m.

It has proven especially advantageous to dope the fiber core, normally consisting of quartz glass, with YIG material, which exhibits a sufficiently large Faraday effect.

Preferably, the optical waveguide according to the invention is used as a single waveguide.

The optical isolator according to the invention is a fiberoptic isolator with at least one polarizer and one polarization rotator with an optical waveguide that has a core having a sufficiently large Faraday effect and an outer coating. According to the invention, the outer coating is configured such that it generates a permanent magnetic field in the core.

According to another advantageous aspect of the invention, the polarizer comprises a polarization-maintaining or a polarization-rotating glass fiber, where the fibers of the polarizer and the polarization rotator are constructed in one piece as spliced, continuous optical glass fibers.

Additional advantages of the invention can be seen from the description below with the appended drawings, showing in:

Figure 1, the schematic structure of a known "bulk" isolator;

Figure 2, the essential elements of an optical isolator according to the invention; and

Figure 3, the optical isolator according to the invention in cross section.

For better understanding of the invention, a conventional optical isolator will first be described with reference to Figure 1. Via a glass fiber cable 21 containing an optical waveguide 27, (glass fiber, glass fiber core), a light signal reaches optical isolator 23, and reaches another glass fiber cable 25 via another optical waveguide 27. Glass fibers 21 and 27 each consist of a core (index of refraction n_K) and a cladding (refractive index $n_M < n_K$).

The isolator consists of a polarizer and a polarization rotator, incident light being coupled into the polarizer by way of a plug connection or a splice 31. The polarization rotator brings about a rotation of the polarization direction of the incident signal light by 45°. The light rotated in the polarization direction leaves the isolator via an additional plug connection or splice 33.

A housing 35 that contains the plug connections/splices 31/33, the polarizer and the polarization rotator is provided for the protection of the isolator.

The rotation of the direction of polarization by the polarization rotator is achieved by means of the electrooptical effect. For this purpose a magnetic field is applied to a suitable crystal.

The extent of rotation (angle of rotation Φ of the plane of polarization) is calculated as:

$$\Phi = R \cdot l \cdot H$$

where l designates the length, H the magnetic field strength and R the material- and frequency-dependent Verdet constant.

Accordingly, the device shown in Figure 1 contains a means 39 generating a permanent magnetic field that is integrated into the isolator 23 seated on a mounting plate 39.

The device shown in Figure 1 has the disadvantage that it is not integrated into the cable, but rather the housing projects from the cable. This makes it difficult to lay the cable over rather long distances, such as in marine cables and the like.

Figure 2 shows a sketch of an isolator according to the invention. According to the invention, the isolator is integrated into cable 13 as a fiber-shaped element. Cable 13 has two optical waveguides 1, which are connected by way of the optical fiber isolator,

consisting of a polarizer optical waveguide 1A and a polarization-rotating optical waveguide 1B. 2, 4, 6 designate the splice joints between the respective elements. Thus, the polarizer and the polarization rotator are integrated in the form of waveguides into cable 13. A polarizing fiber 1A (if the incident radiation is not polarized) or a polarization-maintaining fiber 1A (if the incident radiation is polarized) is used as the polarizer. A special glass fiber 1B, shown in cross section in Figure 3, is used as the polarization rotator. The length of the glass fiber 1A serving as polarizer can be relatively short (less than 5 m). The length of the polarization-rotating glass fiber 1B, on the other hand, depends on the wavelength of the radiation being used, the Verdet constant R of the core material, and the magnetic field strength H. By virtue of the above-described mode of construction the attenuations produced by the optical isolator are relatively low.

Figure 3 shows the schematic structure of the polarization-rotating waveguide 1B: It consists of a glass fiber core 11 with a positive Verdet constant R. The glass fiber core 11 is surrounded by a cladding 3. A coating 5 that consists of a magnetic or magnetizable material is applied to the cladding 3. The coating 5 generates the magnetic field at the site of the glass fiber core 11. To this end, the magnetic coating is preferably divided into two half-shells forming the magnetic north and south poles.

Corresponding to a preferred embodiment, the glass fiber core 11 is doped with a material having a sufficiently large Verdet constant R. An example of this in the range of a wavelength $\lambda > 1500$ nm is the material YIG (yttrium-iron garnet). This has an angle of rotation of 175 °/cm at 10^4 G (1 T).

Because of the relatively large interaction lengths of roughly 10 m, it suffices that the coating 5 generates a relatively weak magnetic field. Under the preconditions above and an interaction length $l = 10$ m, a magnetic field of 2.6 G (260 μT) is sufficient.

//insert equation a, p. 7//

The magnetic or magnetizable materials/thin films known from data and sound recording technology come into particular consideration as coating 5.

Alongside the small diameter of the polarization rotator thus constructed, which permits integration into the cable, the possibility of easy joining by fusion splicing exists, which can reduce reflection at the joint site. In combination with a polarizing or polarization-preserving glass fiber as polarizer, it is thus possible to construct an optical isolator that is completely integrated into the cable.

Although the invention was described in the foregoing with reference to a special embodiment, the invention is not limited thereto. Instead of doping with YIG, for instance, doping can be accomplished with other materials with a suitable Verdet constant. Such materials as those used for the magnetic coating of data media suggest themselves as materials for the magnetic coating. It is possible to effect the magnetization of the coating only after application of the coating to the cladding 3 of glass fiber core 11.

Claims

1. Optical waveguide with a fiber core (11) having a sufficiently large Faraday effect, a fiber cladding (3) and an outer coating (5), characterized in that the outer coating (5) consists of a magnetizable material or a material having magnetic properties.

2. Optical waveguide according to Claim 1, characterized in that the outer coating (5) is subdivided into two half-shells (7, 9) whose magnetic orientations are mutually opposed.

3. Optical waveguide according to Claim 1, characterized in that the core (11) is doped with YIG material.

4. Optical waveguide according to Claim 1, characterized in that the optical waveguide is a single waveguide.

5. Optical isolator with a polarizer (15) and a polarization rotator (13) with an optical waveguide that contains a fiber core showing the Faraday effect, a fiber cladding (3) and an outer coating (5), characterized in that the outer coating (5) generates a permanent magnetic field in the core (11).

6. Optical isolator according to Claim 5, characterized in that the polarizer (15) comprises a polarization-preserving or polarization-rotating glass fiber, wherein the fibers of the polarizer (15) and the polarization rotator (13) are constructed in one piece as a continuous, spliced optical glass fibers.

7. Optical isolator according to Claim 5, characterized in that the outer coating (5) of the optical waveguide is subdivided into two half-shells (7, 9) whose magnetic orientations are mutually opposed.

8. Optical isolator according to Claim 5, characterized in that the core (11) is doped with YIG material.

9. Optical isolator according to Claim 5, characterized in that the optical waveguide is a single waveguide.

Abstract

1. Optical waveguide and fiberoptic isolator

2. The optical waveguide rotating the plane of polarization of coupled light consists of a fiber core (11) exhibiting the Faraday effect, a fiber cladding (3) and a coating (5) concentrically surrounding the YIG-doped fiber core (11) and generating a permanent magnetic field. The outer coating (5) is manufactured from a material that is magnetizable or has magnetic properties.

3. Figure 3

4. Fiberoptic isolator

//insert figures//